# Modeling and Simulation Support to Army Acquisition

## Briefing To the Orlando Chapter of The International Council Of Systems Engineers (INCOSE)
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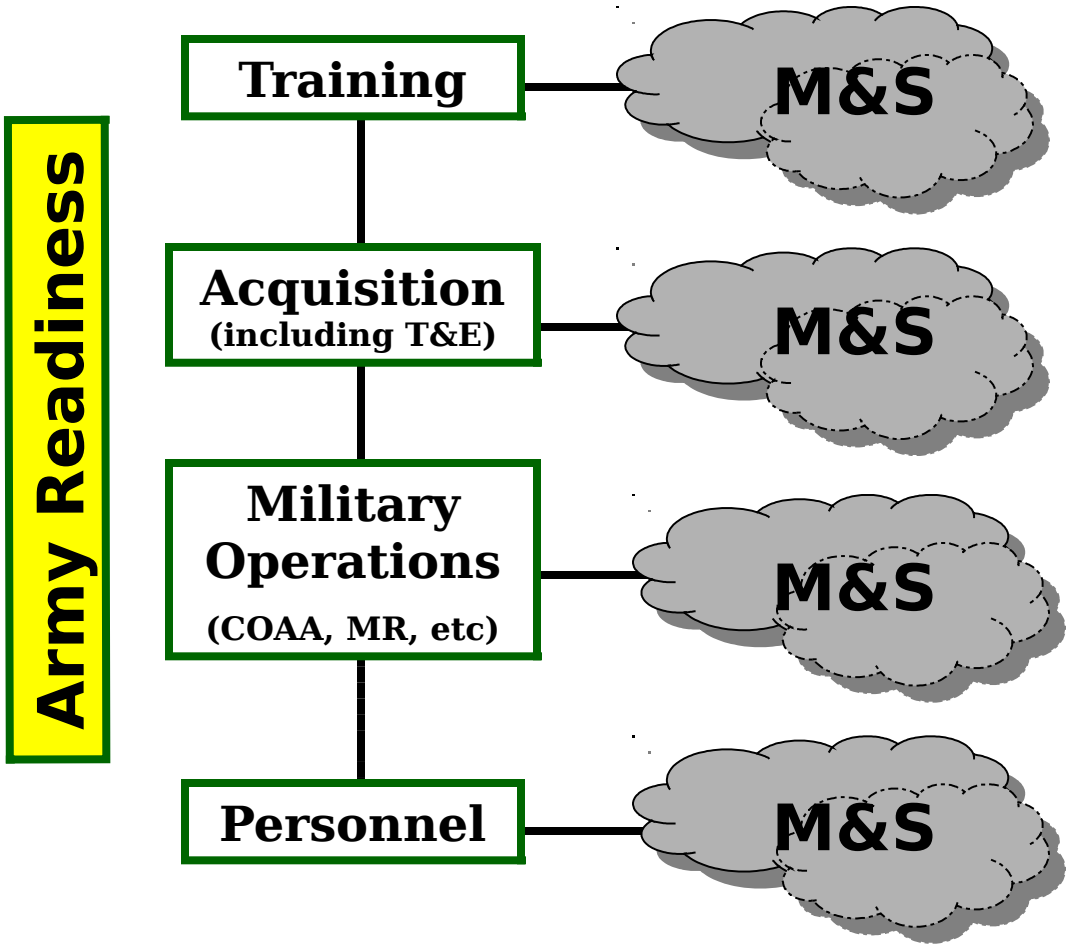
# Supporting the Warfighter:
## Why Simulation is Army Mission Critical




**Good News:**

- Hundreds of examples of successful M&S applications exist:
  - Range expansion via DBST
  - Application to Test & Evaluation
  - Joint Virtual Battlespace
  - RDEC Federation

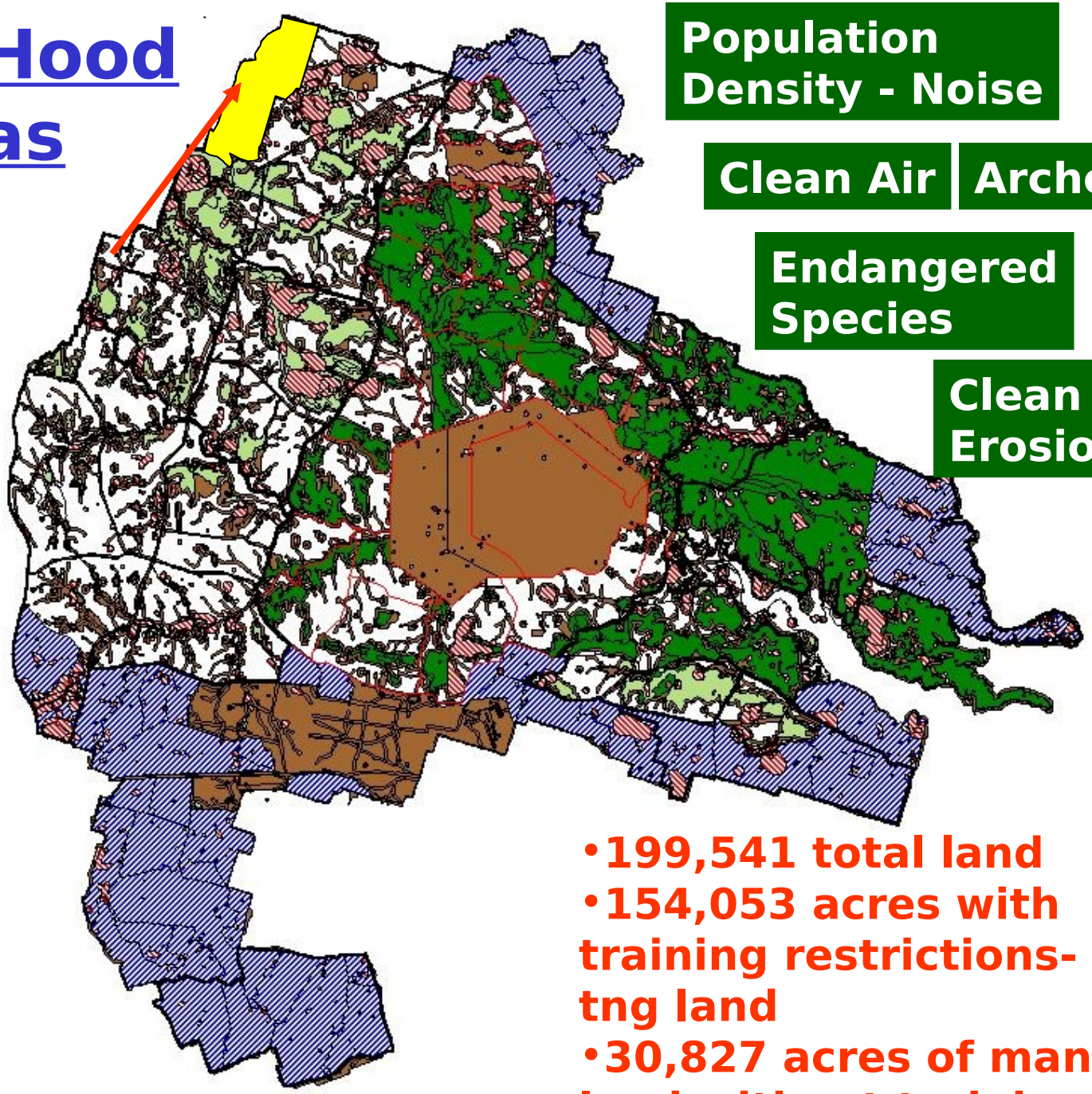
**Needs improvement:**

- State of the Art being pushed:
  - Lack 'best practices'
  - Technology immature
  - Modeling emerging military needs immature.
  - Practices/processes/policy
- Army has an OJT trained workforce

**AMSO Strategic Goal**

**Institutionalize modeling and simulation within the Army by making M&S so effective and efficient it becomes the primary tool of choice – no matter what the job or mission.**

# Ft. Hood Texas



**Population Density - Noise**

**Clean Air** **Archeology**

**Endangered Species**

**Clean Water – Erosion Control**

- 199,541 total land
- 154,053 acres with training restrictions- 77% of tng land
- 30,827 acres of maneuver land without training

# Why Simulation is Army Mission Critical


8 Km

WW II

12 Km

50Km

Ft. Hood

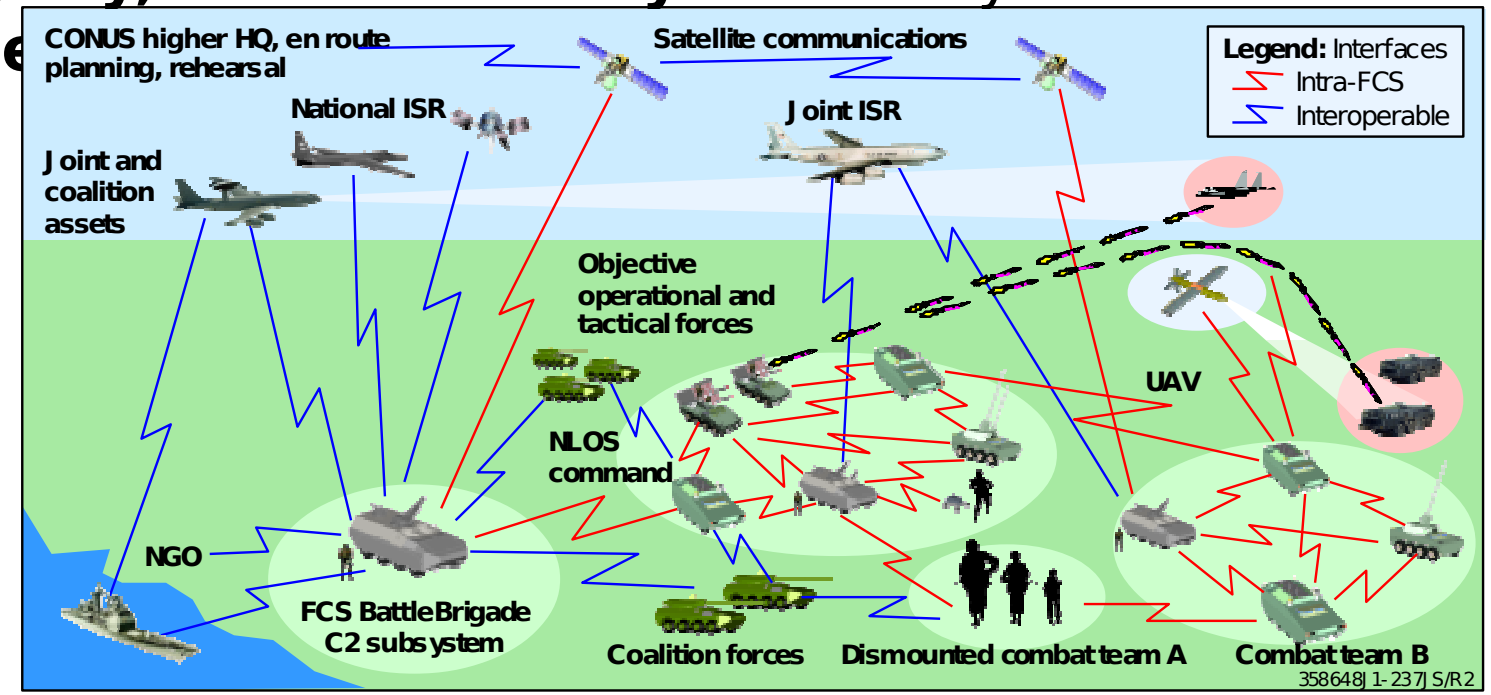
65Km

Desert Storm

***The Evolving Brigade Battlefield***

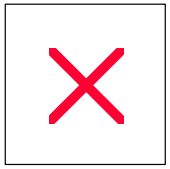
# Future Combat Systems – Definition

**FCS** is the **networked system of systems** that will serve as the **core building block within all maneuver Unit of Action echelons** to develop **overmatching combat power, sustainability, agility, and versatility** necessary for **full spe**

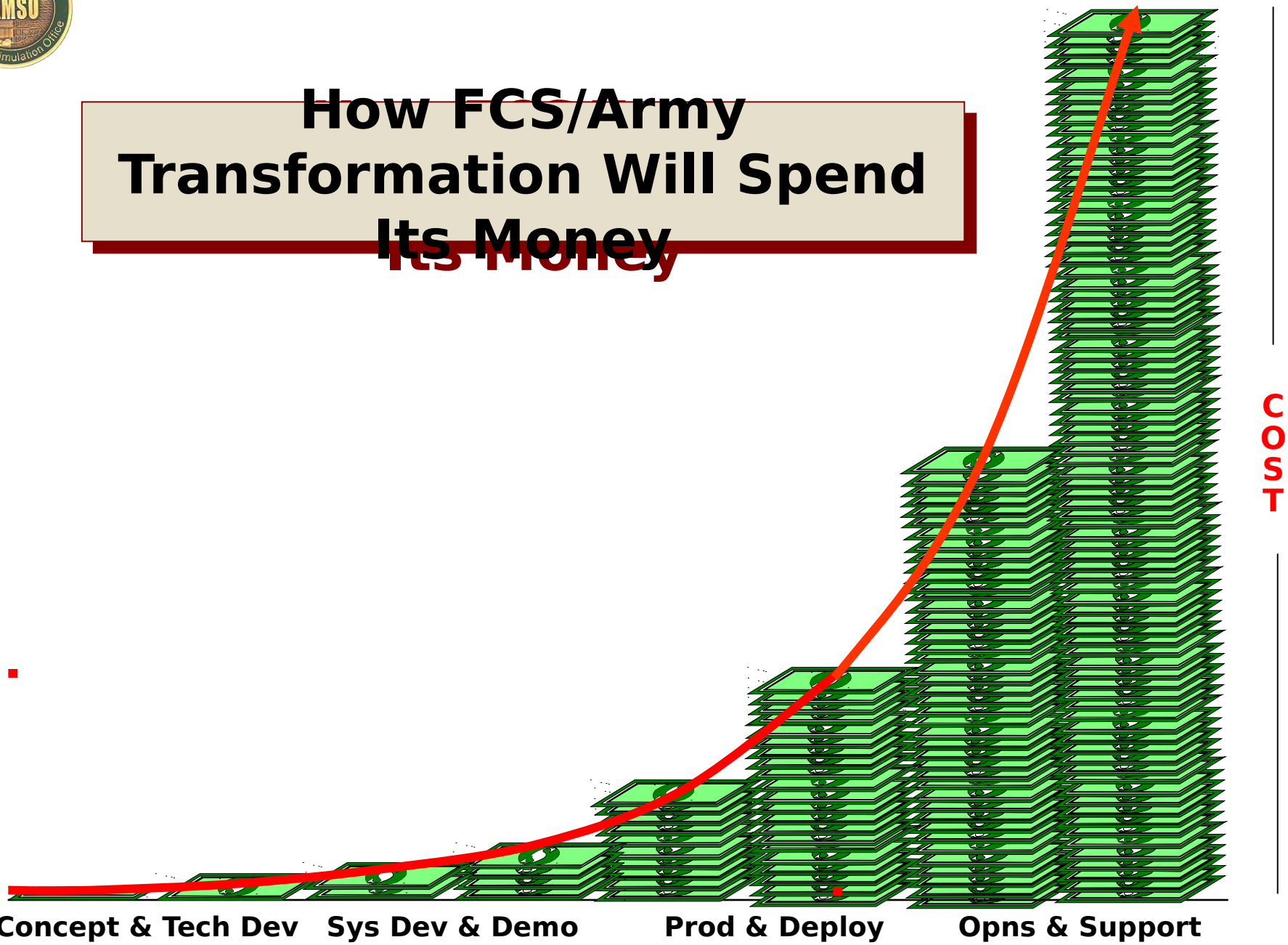



Soldier-centric, Knowledge-based, Network enabled

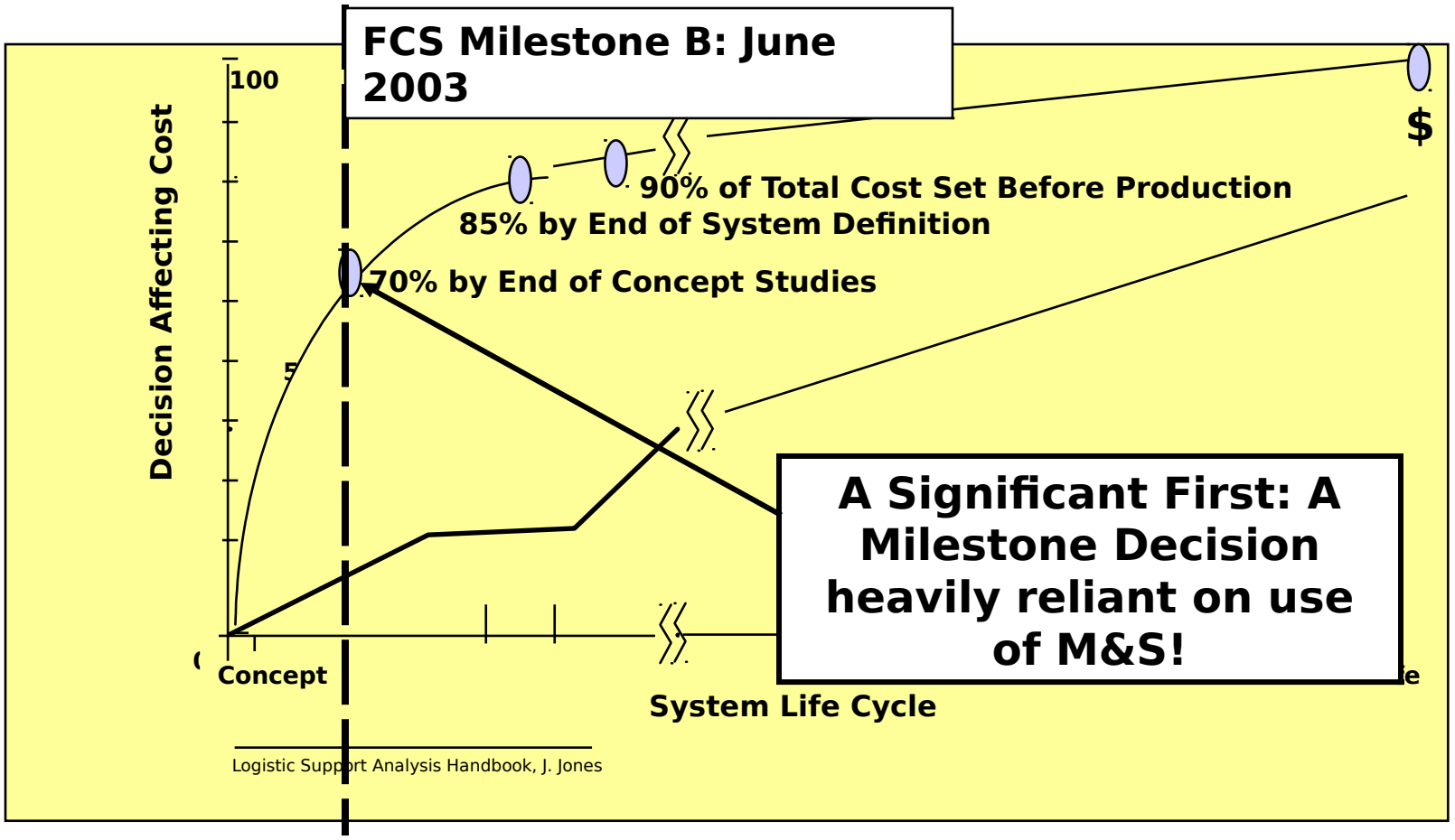
# Trading Armor for Information
# The Basis of FCS



# How FCS/Army Transformation Will Spend Its Money

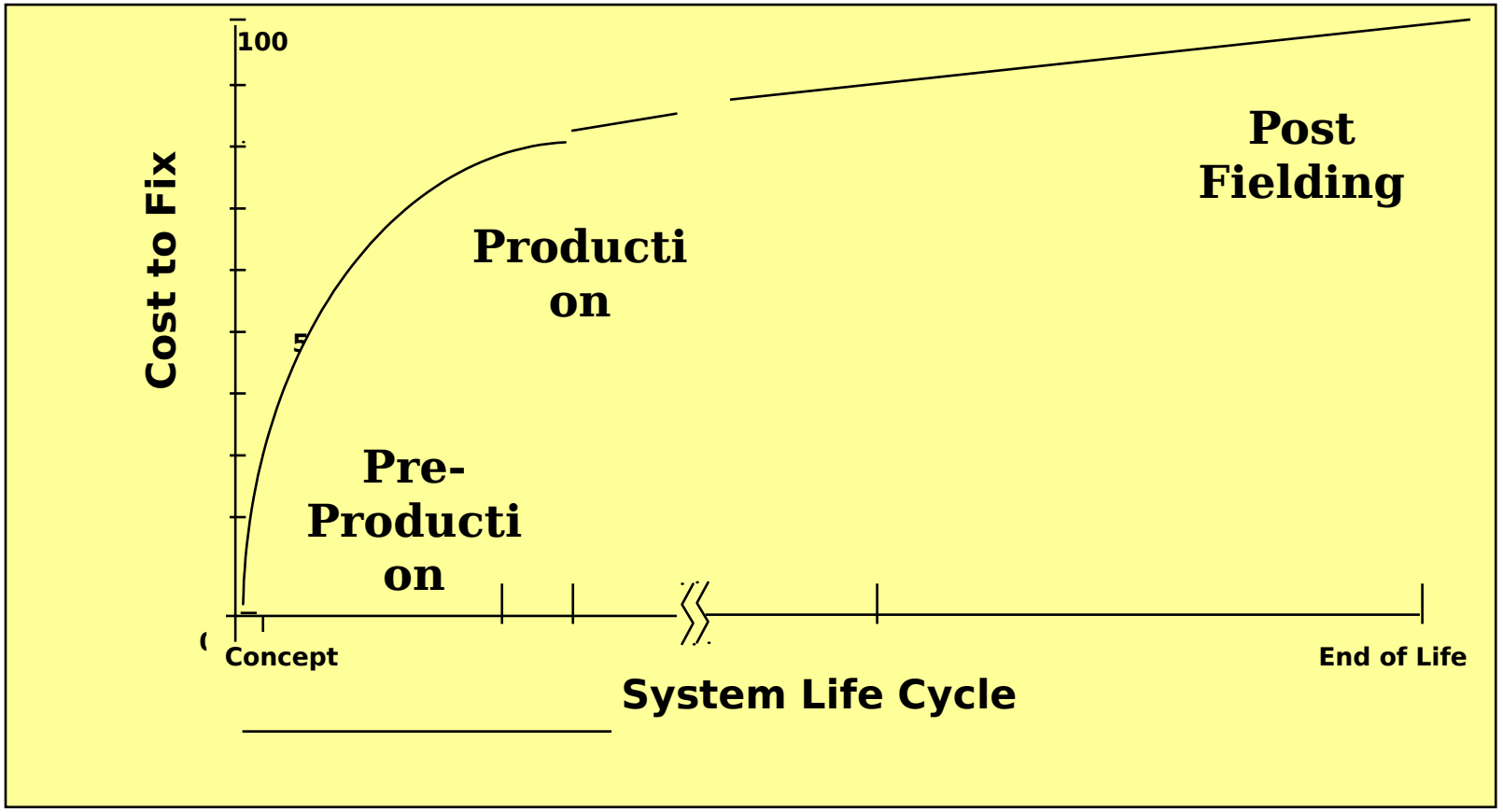


# Life Cycle Costs Are Locked in During the Up Front Design and Development Process




**M&S Is A Critical Component To Army Transformat**

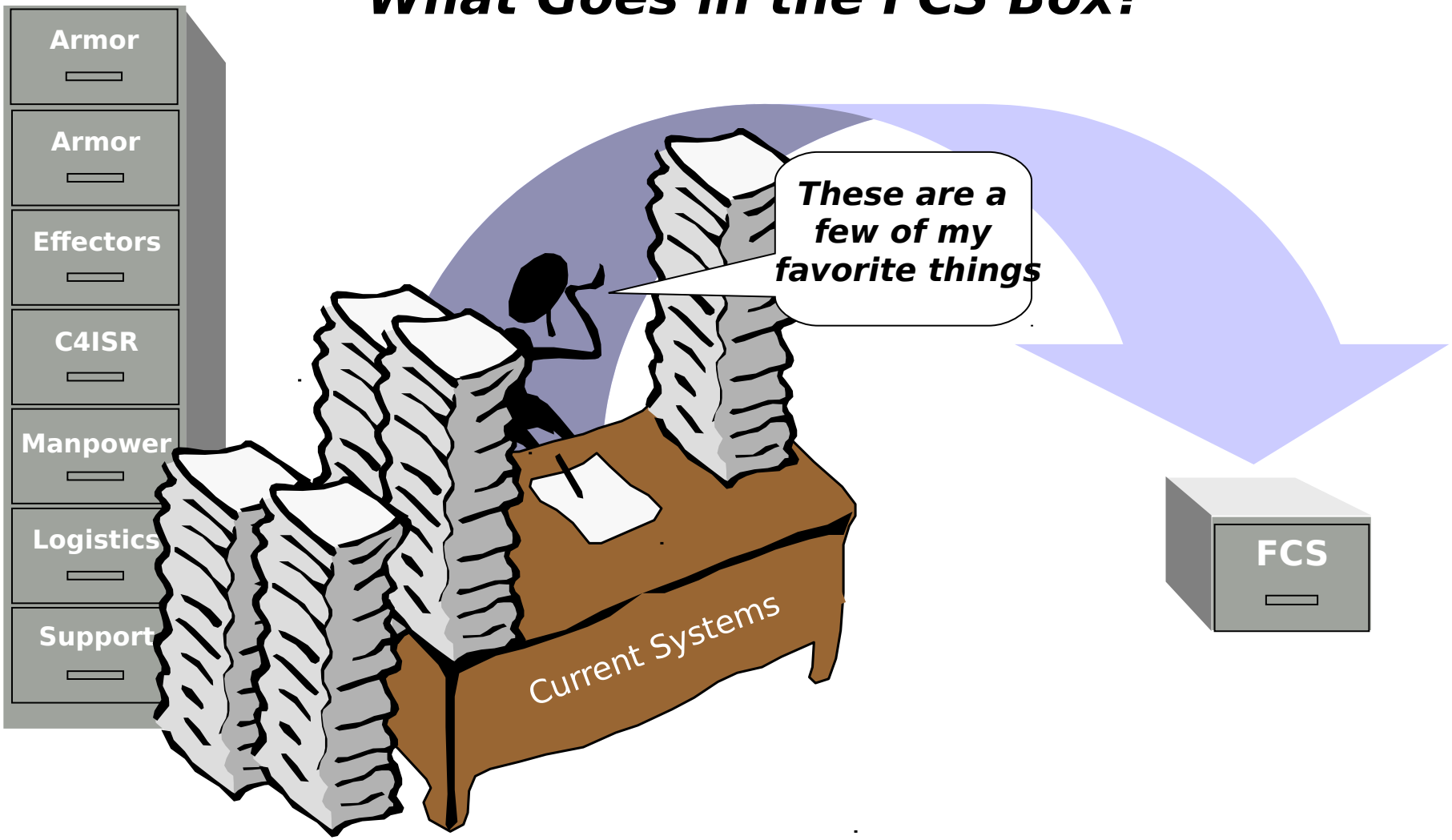
# Cost to Fix a Design Flaw




**Why M&S Is Critical During the Design Phase (S**

# The Challenge…

## *What Goes in the FCS Box?*

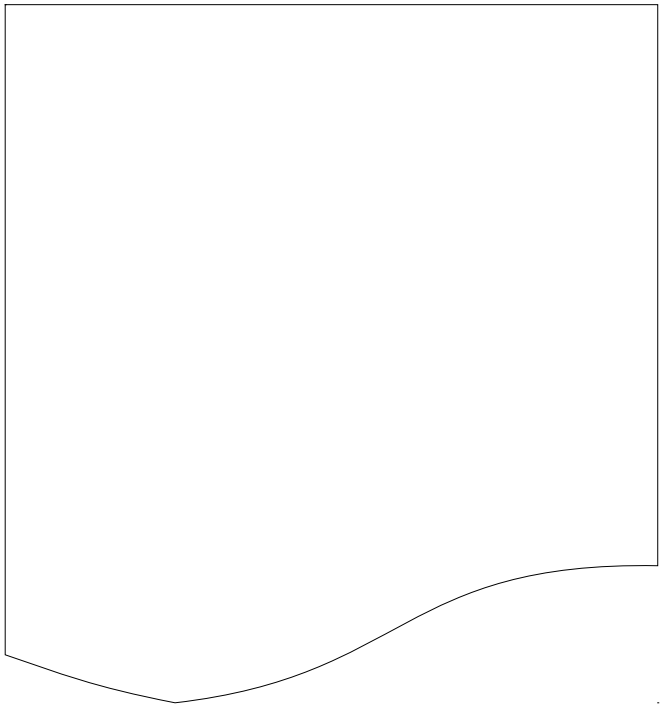



## How Does Application of SMART Help?

# The FCS Systems Engineering Puzzle

***How do we put it together?***

# Army Transformation Starting Point



# Systems Engineering Process

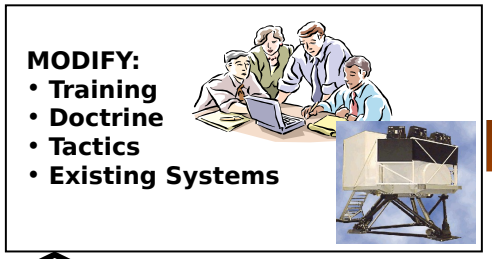
**What is SE?** A logical sequence of activities and decisions transforming an operational need into a description of system performance parameters and a preferred system configuration.

**Why should Army Transformation care about SE?**

- Design space and complexity so large
- System of systems: working across organizational and cultural boundaries
- Technology both a boom and a risk
- Money doesn't grow on trees…even in the U.S.
- Must work first time, every time

# DoD Design Process

## From Concept to Full Mission Ready Without Leaving the Computer





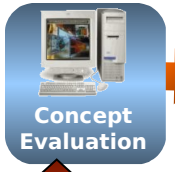

***Organizational Culture***
***Knowledgeable Workforce***
***Architecture, Infrastructure, & Core Technologies***

FULLY MISSION CAPABLE

Analysis & Simulation Support Plan

New System Procurement

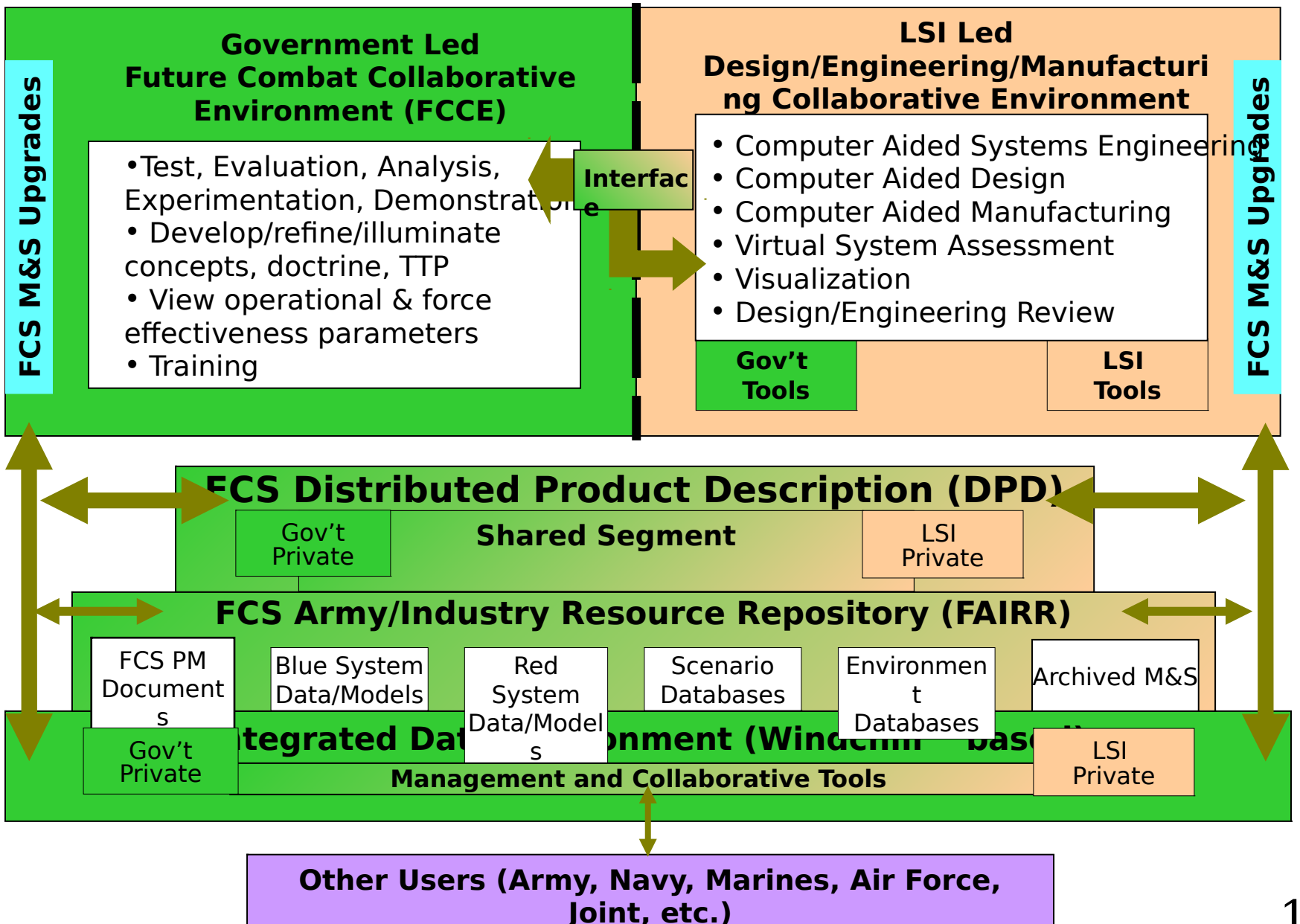





FULLY INTEGRATED CAD/M&S

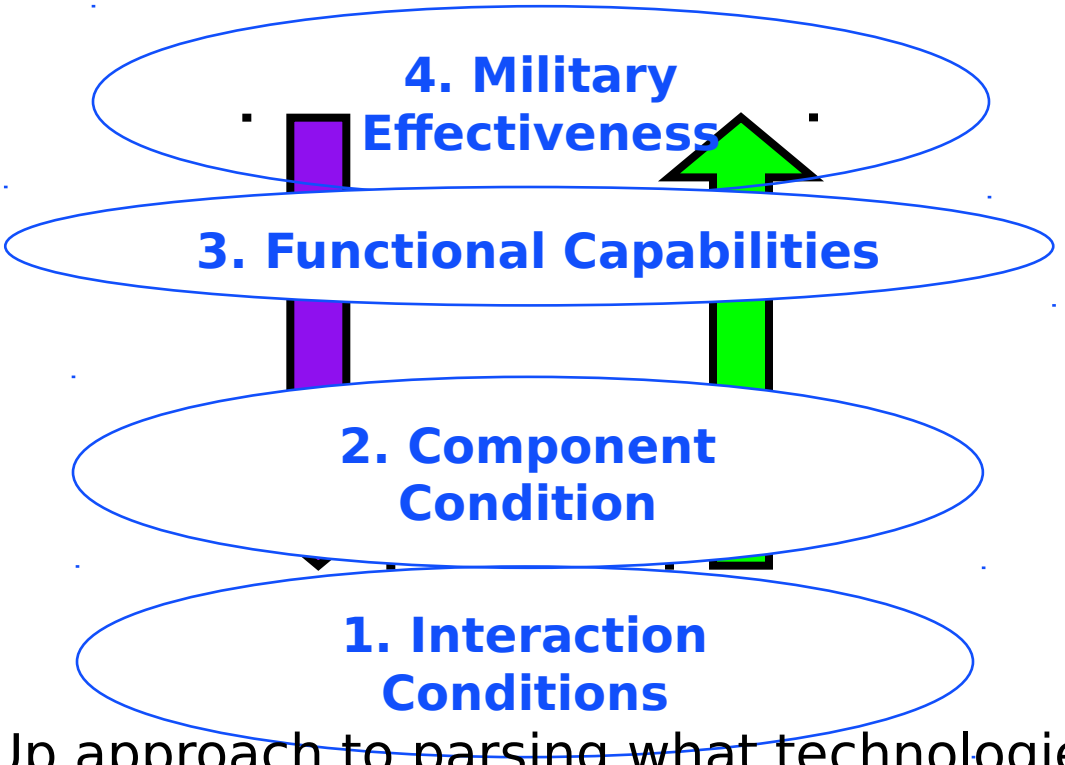


# FCS Advanced Collaborative Environment (ACE)



# FCS Analytic and Evaluation Framework

Top Down decomposition enables definition of mission effectiveness.

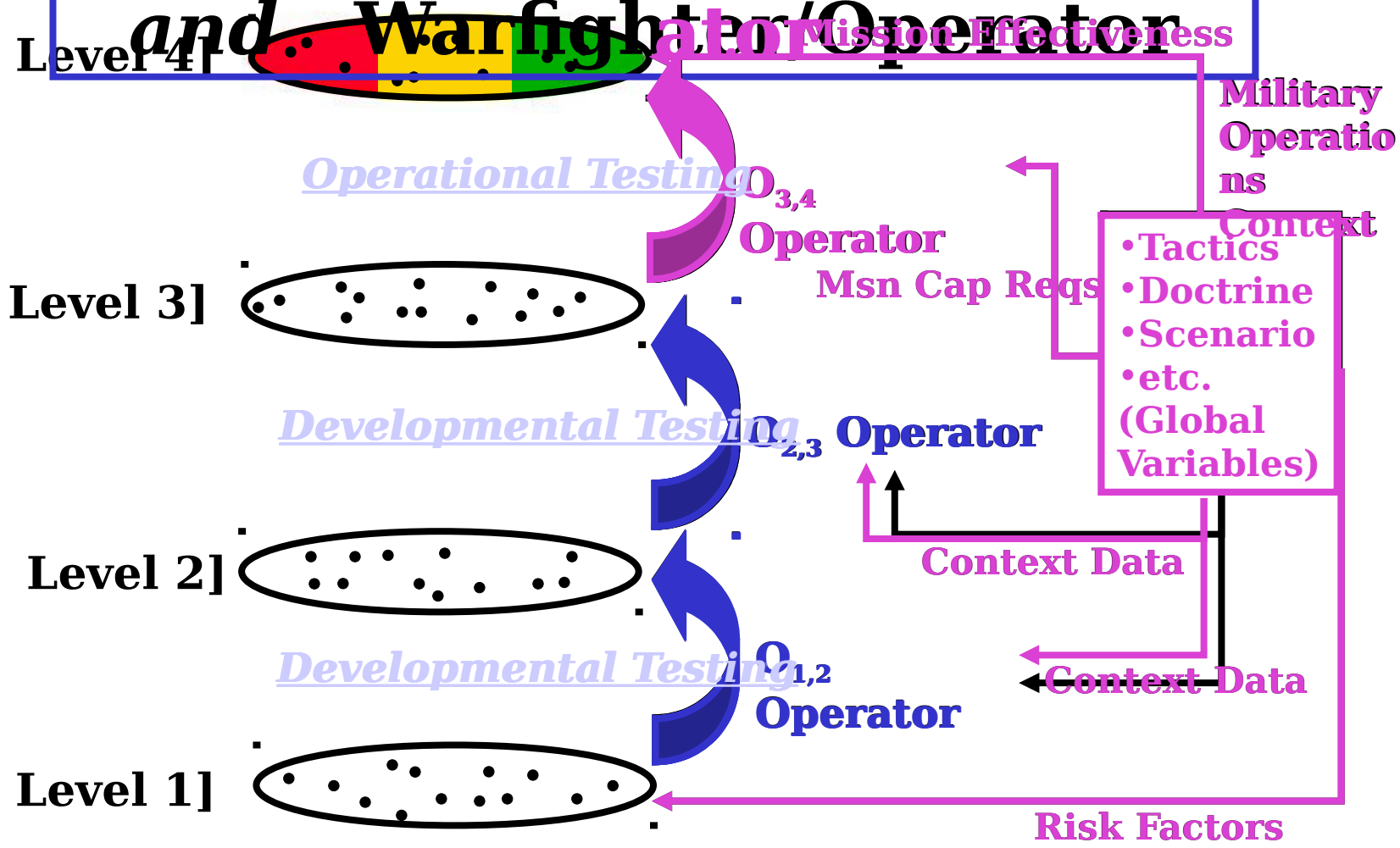



Bottom Up approach to parsing what technologies contribute to capabilities which in turn contribute to operational effectiveness.

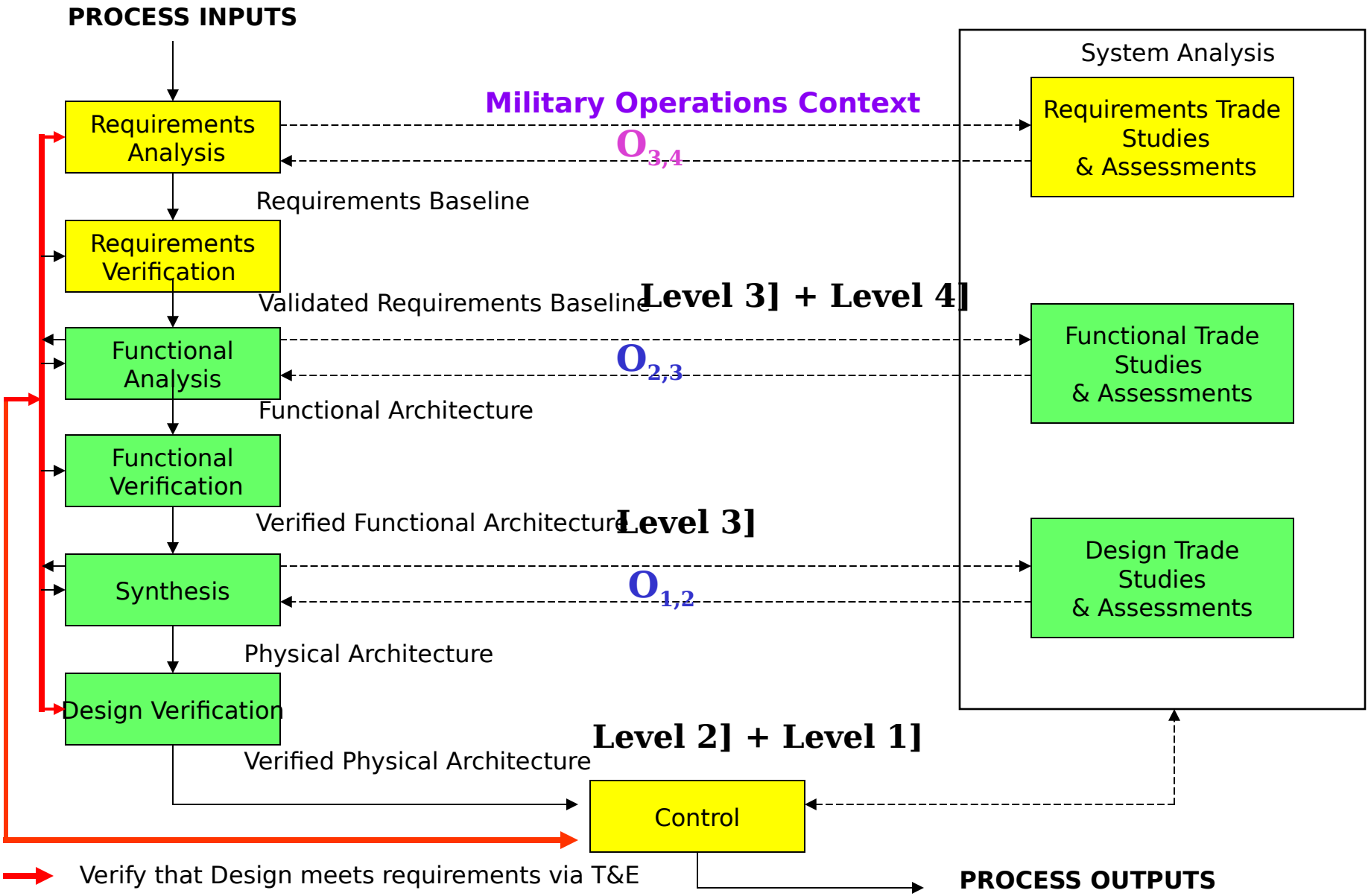
# Requirements Analysis Defines Context to Enable SE Output Development (Architectures, Baselines, Specifications)

**User Expectations**
**Project/Enterprise Constraints**
**External Constraints**
**Operational Scenarios**
**Measures of Effectiveness**
**System Boundaries**
**Interfaces**
**Utilization Environments**
**Life Cycle Processes**
**Functional requirements**
**Performance Requirements**
**Modes of Operation**
**Technical Performance Measures**
**Physical Characteristics**
**Human Systems Integration**

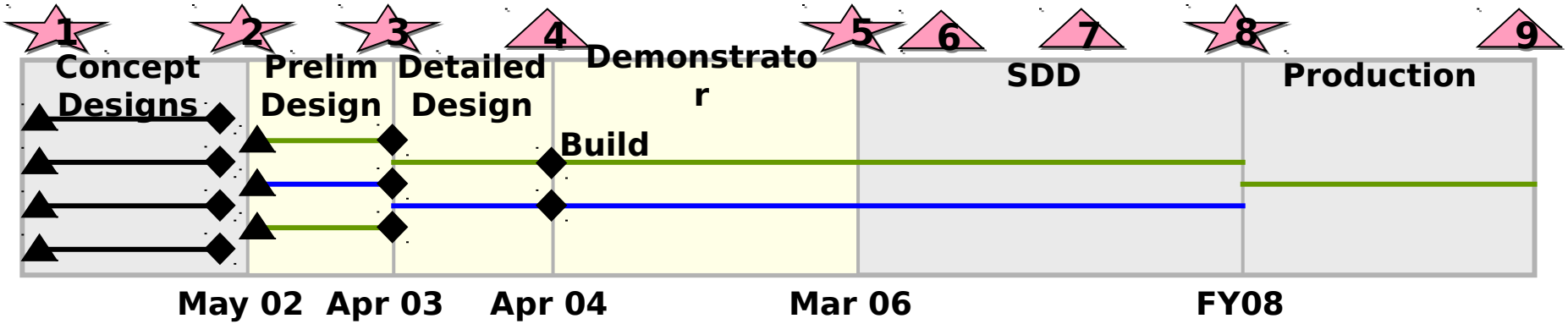
# Division of Labor: Scientist/Engineer and Warfighter/Operator

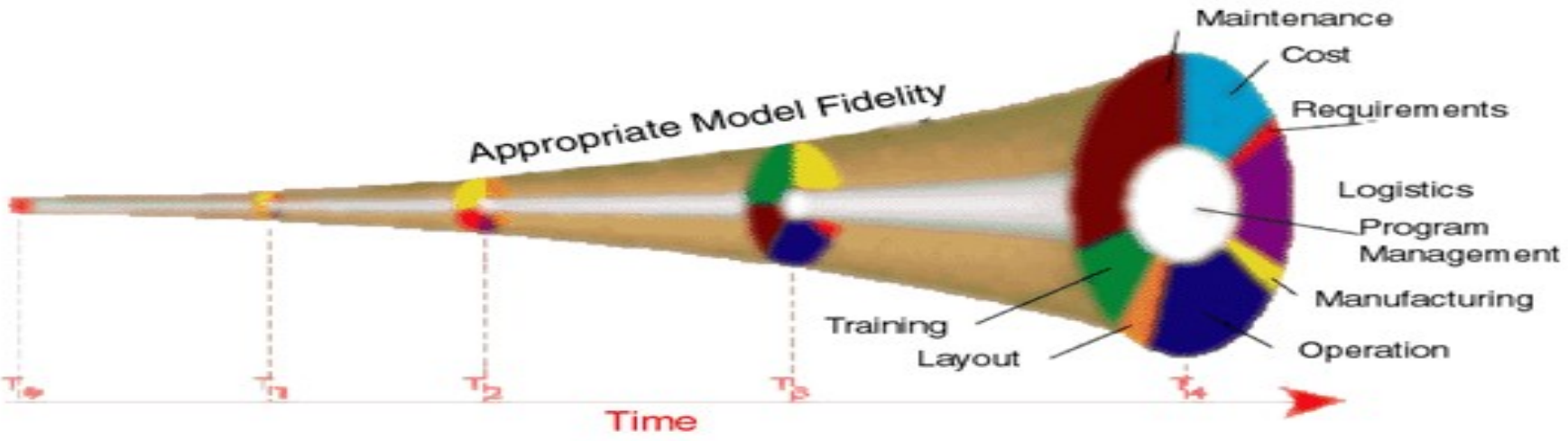


# Use SE Process Outputs to feed TAMS Constr



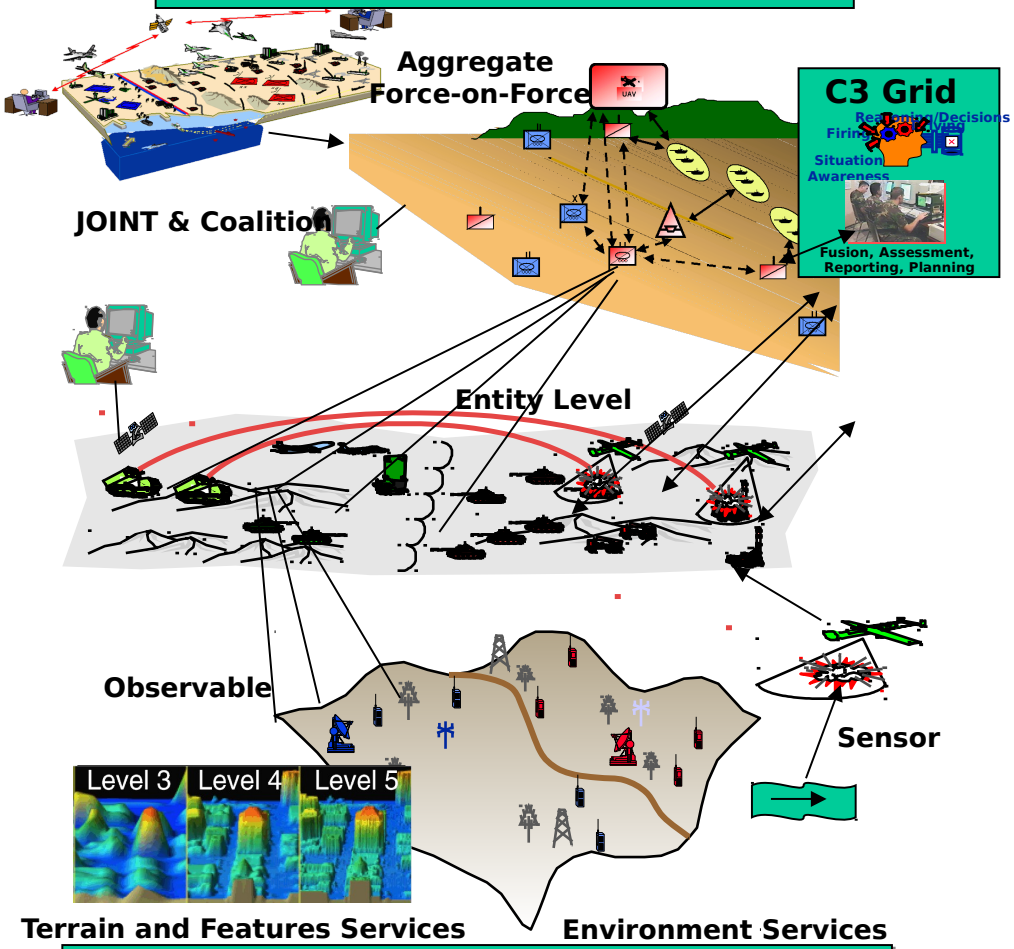
# FCS Distributed Product Description



# M&S: Open and Reusable Architecture

## Joint Virtual Battlespace (JVB)




**Integrate Best Of what Is Available for the Analysis, Build Only What is Absolutely Necessary**

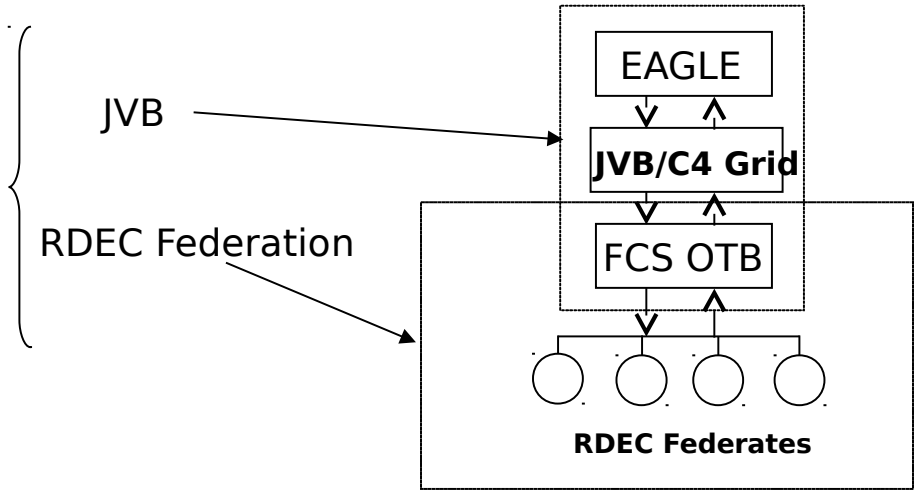
## RDEC FEDERATION

**Geographically Distributed**


**VERTICAL AND HORIZONTAL INTEGRATION WITHIN AND ACROSS FUNCTIONAL AREAS**

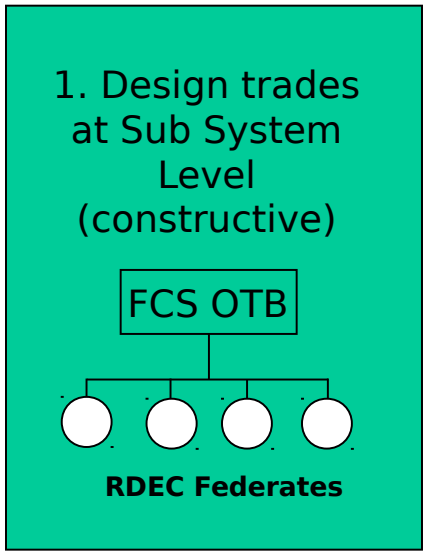
# Recommended OF M&S Architecture Approach

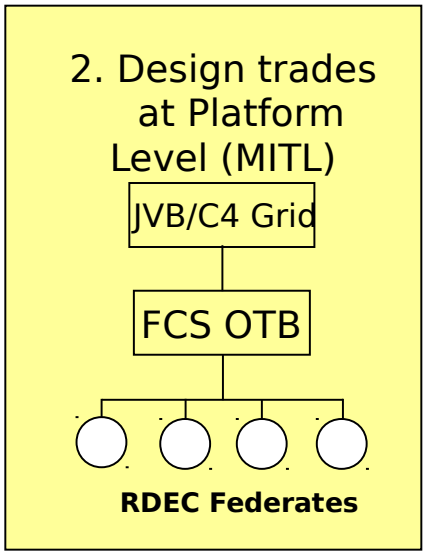
OF M&S Architecture

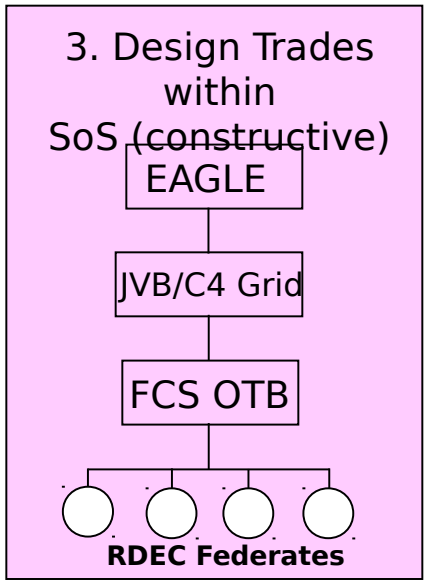


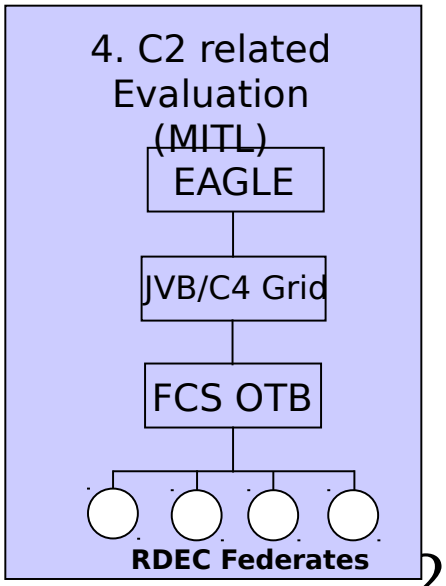

**Components can be mixed and matched to meet specific user needs**

- OTB/OneSAF is critical linkage
- Allows selection of multiple 'fidelity threads' from Corps to engineering level

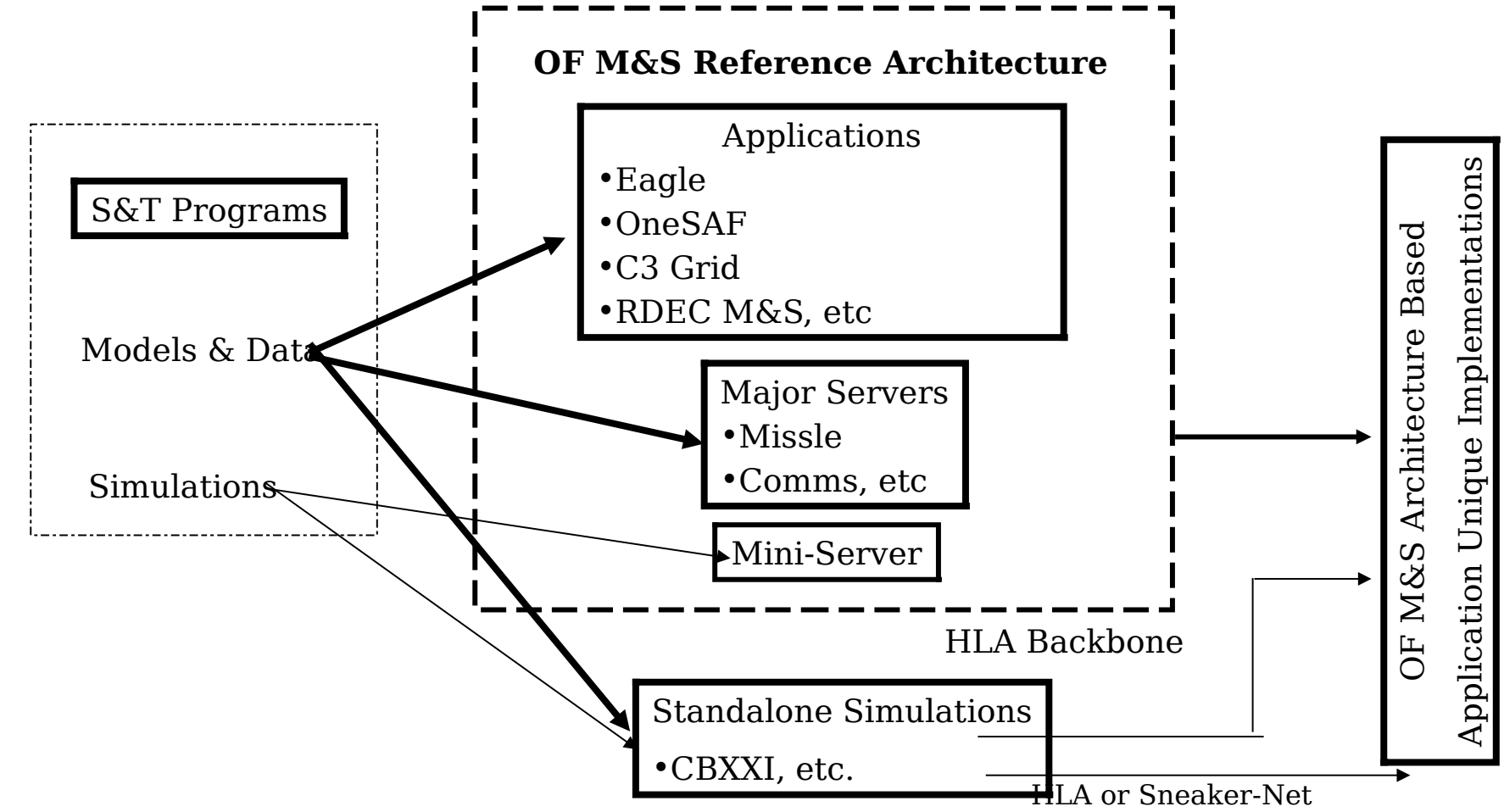


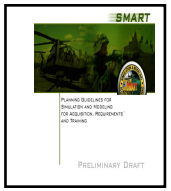



# S&T Is Where SMART Starts








**TRADOC ICT or PM SSP**

# Simulation Support Planning

**A Simulation Support Plan (SSP) is a "roadmap" that lays out how M&S tools support overall development of a concept or a system. The SSP depicts the how and when M&S tools are integrated, utilized and transitioned in the course of concept exploration and system development. [SMART Guidelines]**

**Army: [AR 5-11]**

**SSP required for all ACAT I, II and non-major systems…**

**Programs: [DA Pam 70-3]**

**The PM articulates his M&S strategy via the SSP…**

**Combat Development: [TRADOC Pam 71-9]**

**Integrated Concept Teams (ICT) are established to develop concepts, and requirements documentation… The ICT produces the initial [simulation support] plan for management of simulations…**

**Advanced Technology Demonstrations: [DA Pam 70-3]**

**If an ATD includes significant simulations/simulator support…a SSP must be developed…**

# SSPs are Required

# The Army and AMSO's Challenge

**Provide a quality workforce, equipped with adequate technology, process and practices that support institutionalization of SMART/M&S within every aspect of the Army's mission space**

- **Some challenges are technology**
  - Current ability to model emerging Army missions weak
  - Core Simulation technology still immature
  - Simulations cost too much, too hard to use, too hard to understand

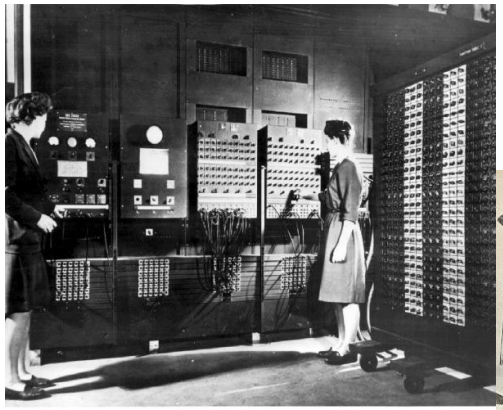
**Con't**

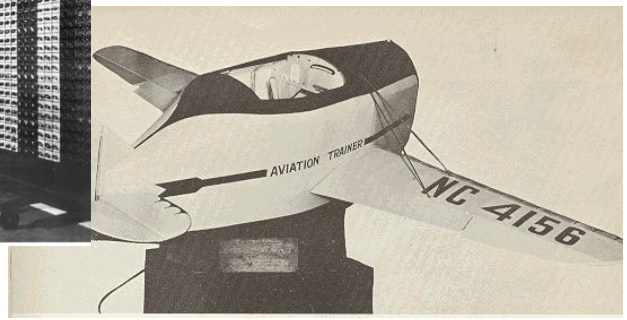
# The Army and AMSO's Challenge

- **Some challenges are policy, process and/or practice**
  - Everyone 'owns' M&S, thus no one does
  - Integration of M&S into the *requirements approval* process
  - Effective competition in the *budget/POM* process
  - Weeding out duplication
  - Not well coordinated across Services (i.e. Joint interoperability)
- **Some challenges are educating and enabling the workforce**
  - Workforce OJT trained
  - Limited formal and informal educational opportunities
  - M&S best practices still a mystery
- **A lot are related to our Business Model**

**We Need Community Wide Dialog on virtually every one of these subjects!**

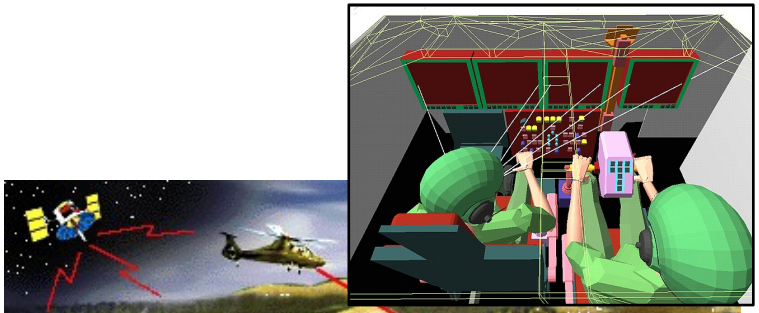
# How do you explore the future, by going there and experiencing it today or by consulting fortune tellers, tarot cards and crystal balls?






**CSA Conditions Review 4/9/2002:**

**GEN Shinseki directed the implementation of SMART NOW**





**LTG CALDWELL, 2002 SMART Conference:**

**<u>On people not yet sold on SMART</u>:**

**“You’ve got a little bit of time to be sold, or go do something else where you don’t need to use this… And we’re going to make the rounds pretty soon.”**